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Review Article

Efficacy of Neck Stretching Exercises in Mitigating Neck Pain and Self-Reported Disability Post-Thyroidectomy: A Meta-Analysis

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Abstract

Background: We aimed to forecast the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain.

Methods: Until Feb 2025, an inclusive literature study was accomplished, and 654 related studies were reviewed. The 5 nominated studies encompassed 654 patients with thyroidectomy at the beginning of the study and were selected for the meta-analysis. The mean difference (MD) and 95% confidence intervals (CIs) were used to examine the outcome of the neck stretching exercises compared to control on thyroidectomy using continuous methods with either a fixed or random model.

Results: In cases with thyroidectomy, neck stretching exercises had significantly lower mean neck pain score after 1 week (P=0.001), mean neck pain score after 1 month (P=0.01), mean self-reported neck disability score after 1 month (P<0. 001) compared to control treatment. Nonetheless, no significant difference was detected between neck stretching exercises and control treatment in mean self-reported neck disability score after 1 week (P=0.06) in patients with thyroidectomy. In patients with thyroidectomy, neck stretching exercises had significantly lower mean neck pain score after 1 week, and after 1 month, and mean self-reported neck disability score after 1 month, however, no significant difference was found in mean self-reported neck disability score after 1 week compared to control treatment.

Conclusion: More research is necessary to confirm this discovery, and care must be used while interacting with its values since many comparisons had a low number of included articles and a small sample size of most of the selected studies.

Keywords: Post-surgery; Disability; Pain; Thyroidectomy; Neck stretching exercises; Neck stretching exercises

Introduction

Thyroidectomy is the predominant surgical intervention in endocrine surgery globally (1). The incidence of thyroidectomy has steadily risen in recent decades, indicative of the growing detection of thyroid nodules and thyroid cancer. Numerous reports have underscored the increasing frequency of thyroidectomy procedures, with 350,000 surgeries conducted annually (1).

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Post-thyroidectomy problems, including postoperative hemorrhage, hypocalcemia, and recurrent laryngeal nerve damage, have diminished due to enhanced surgical procedures and innovative technologies, e.g., recurrent laryngeal nerve monitoring devices (1). Increased attention is now directed towards various problems, including postoperative neck stiffness and discomfort. Thyroidectomy can result in considerable cervical pain and impairment, accompanied by restricted mobility (2). These problems might have an adverse effect on the patient's quality of life (QoL) and social connections. Furthermore, the prospective healthcare expenses of lifelong physical or analogous therapy can be substantial (3).

The hyperextension position during the procedure is posited as the primary cause of neck pain and disability after thyroidectomy. Furthermore, patients may refrain from neck movement postoperatively to prevent pain exacerbation and safeguard their surgical incision, which can result in mechanical neck pain. Consequently, various intraoperative and postoperative interventions have been explored to mitigate this complication, including analgesics and neck stretching exercises. Neck stretching exercises have been documented to enhance the range of motion, alleviate muscle pain, and improve neuromuscular coordination following several surgical procedures, e.g. mastectomy, thoracotomy, and orthopedic operations (4). Consequently, further research is necessary to synthesize and evaluate the relevance of this intervention.

This meta-analysis aimed to consolidate the existing information on the impact of neck stretching exercises in reducing self-reported disability and neck pain immediately after thyroid surgery.

Methods

Eligibility criteria

To deliver an indication of the studies that presented the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain (5).

Sources of Information

The full investigation is depicted in Fig. 1.

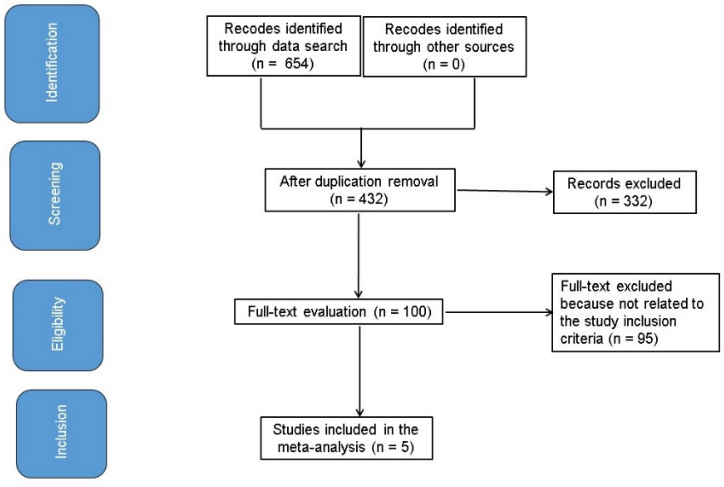

Fig. 1: Shows a procedure flowchart for the research

The studies were included if the following inclusion criteria were met: (6, 7)

1. The research was observational, retrospective, prospective, or randomized controlled trial (RCT).
2. The patients picked for examination had a thyroidectomy.
3. Neck stretching exercises were included in the study.

4. The study completed a difference in the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain.
Studies that did not check the outcome of the neck stretching exercises only compared to control on thyroidectomy, studies on patients with control treatment only, and studies without comparison of significances were removed (8, 9).

Search strategy

The PICOS perspective was used to identify a search protocol procedure, which we characterized as follows: the P "population" contained patients with thyroidectomy; neck stretching exercises were the I "intervention" and the C "comparison" involved comparison between neck stretching exercises and control; the O "outcome" was pain and disability; and the S "study design" was without boundaries (10).
Using certain keywords and other terms (Table 1), we performed a comprehensive search of the Cochrane Library, Embase, PubMed, Google Scholar, and OVID databases through Feb 2025. (11, 12) To stop the addition of a study that was incapable of instituting a connection with the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain, the repetitions of papers were removed, the remaining ones were compiled into an EndNote file, and their abstracts and titles were evaluated once more (13, 14).

Table 1: Database Search Strategy for inclusion of examinations

Database	Search strategy
Google Scholar	#1 "thyroidectomy" OR "neck stretching exercises" #2 "pain" OR "Disability" OR "post-surgery" OR "post-surgery" #3 #1 AND #2
Embase	#1 'thyroidectomy' /exp OR 'neck stretching exercises' /exp OR 'post-surgery' #2 'pain'/exp OR 'disability'/exp OR 'post-surgery' #3 #1 AND #2
Cochrane library	#1 (thyroidectomy):ti,ab,kw OR (neck stretching exercises):ti,ab,kw OR (post-surgery):ti,ab,kw (Word variations have been searched) #2 (pain):ti,ab,kw OR (Disability):ti,ab,kw OR (post-surgery):ti,ab,kw (Word variations have been searched) #3 #1 AND #2
Pubmed	#1 "thyroidectomy"[MeSH] OR "neck stretching exercises"[MeSH] OR "post-surgery" [All Fields] #2 "pain"[MeSH Terms] OR "Disability"[MeSH] OR "neck stretching exercises "[All Fields] #3 #1 AND #2
OVID	#1 "thyroidectomy"[All Fields] OR "neck stretching exercises" [All Fields] OR "post-surgery" [All Fields] #2 "pain"[All fields] OR "Disability"[All Fields] or "neck stretching exercises"[All Fields] #3 #1 AND #2

Selection process

The process that follows the epidemiological proclamation was organized and assessed using the meta-analysis approach (15, 16).

Data collection process

Initial author names, research data, country or location, outcome estimation, type of population, categories, medical and treatment characteristics, quantitative and qualitative assessment methodologies, year of research, data sources, and statistical analyses were among the criteria employed for data collection (17).

Data items

When a study yielded varying results about the assessment of the effectiveness of neck stretching exercises in reducing neck pain and self-reported disability following thyroidectomy, we gathered the data from them separately.

Research risk of bias assessment

Two authors evaluated the potential for bias in the research and the quality of the methods used in the publications chosen for further analysis.

Effect measures

The methodology of each study was assessed objectively by these two authors. Sensitivity analysis was limited to studies that assessed the effectiveness of neck stretching exercises in alleviating neck pain and self-reported disability after thyroidectomy. A subgroup analysis was conducted to examine the relationship between neck stretching exercises and the control group across various patient variables in the sensitivity of thyroidectomy patients.

Synthesis methods

The mean difference (MD), 95% confidence interval (CI), and were computed using continuous approaches, employing either a random or fixed-effect model. The I^2 index was calculated on a scale from 0 to 100%. Heterogeneity levels were categorized as no, low, moderate, and high at I^2 values of respectively 0%, 25%, 50%, and 75%. Additionally, other structures with significant similarity to the relevant inquiry were examined to ensure the same model was applied. A fixed-effect model was selected when I^2 was below 50%; otherwise, a random-effect model was used. A subgroup analysis was performed by dividing the initial estimates into the specified consequence groups. Statistical significance between subcategories was determined using a *P*-value threshold of less than 0.05.

Reporting bias assessment

The Egger regression test and funnel plots, which display the logarithm of the MDs against their standard errors, were employed as two qualitative and quantitative methods to evaluate bias in the studies (18).

Certainty assessment

A *P*-value of ≥0.05 indicated the presence of inquiry bias. Two-tailed testing was applied to analyze each *P*-value. Graphs and statistical analyses were generated using Review Manager Version 5.3 (The Nordic Cochrane Centre, Cochrane Collaboration, Denmark).

Results

From 654 relevant studies, five publications that met the inclusion criteria and were published between 2005 and 2022 were chosen for the study (19-23) (Table 2). There were 1034 patients with thyroidectomy at the start of the investigations. The sample size of the chosen studies ranged from 60 to 409 patients.

Table 2: Qualities of the chosen studies for the meta-analysis

Study	Country	Total	Neck stretching exercises	Control
Takamura, 2005 (19)	Japan	409	205	204
Ayhan, 2016 (20)	Turkey	80	40	40
Mohamed, 2019 (21)	Egypt	76	38	38
Weheida, 2021 (22)	Egypt	60	30	30
Türkmen, 2022 (23)	Turkey	409	205	204
	Total	1034	518	516

As illustrated in Figs. 2-4, in patients with thyroidectomy, neck stretching exercises had significantly lower mean neck pain score after 1 week (MD, -4.74; 95% CI,-7.20- -2.28, *P*=0.001) with high heterogeneity (I2=97%), average neck pain score after 1 month (MD, -6.86; 95% CI, -12.09- -1.64, *P*=0.01) with high heterogeneity (I2 = 99%), average self-reported neck disability score after 1 month (MD, -3.08; 95% CI, -4.88- -1.28, *P*<0.001) with low heterogeneity (I2 = 44%) in comparison to control treatment.

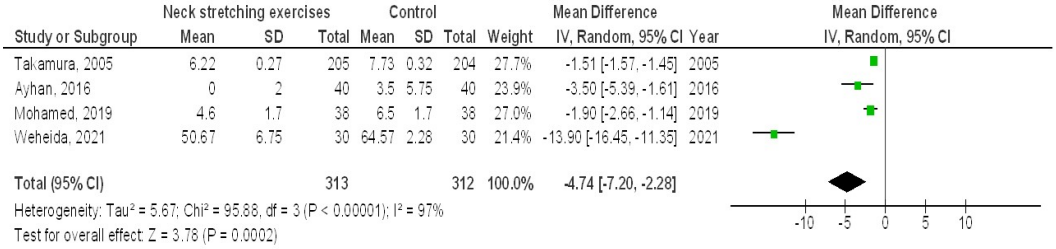

Fig. 2: The neck stretching exercises compared to control treatment's forest plot influence on mean neck pain score after 1 week in patients with thyroidectomy

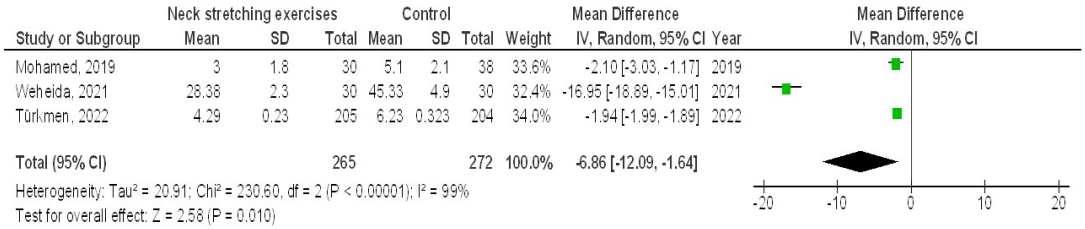

Fig. 3: The neck stretching exercises compared to control treatment's forest plot influence on mean neck pain score after 1 month in patients with thyroidectomy

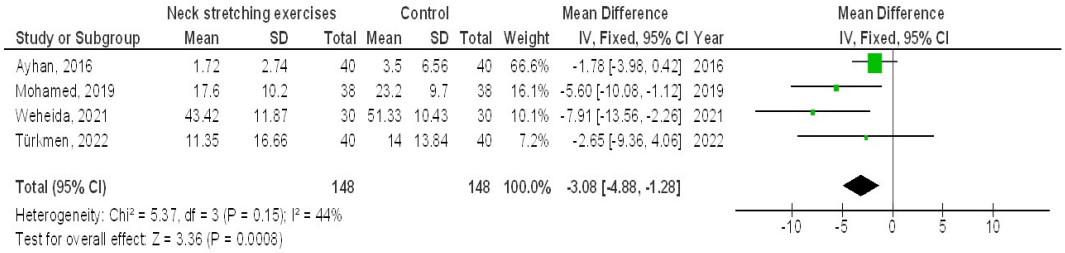

Fig. 4: The neck stretching exercises compared to control treatment's forest plot influence on mean self-reported neck disability score after 1 week in patients with thyroidectomy

However, neck stretching exercises and control treatment showed no significant difference in mean self-reported neck disability score after 1 week (MD, -8.43; 95% CI, -17.14-0.27, *P*=0.06) with high heterogeneity (I2 = 91%) in patients with thyroidectomy as shown in Fig. 5.

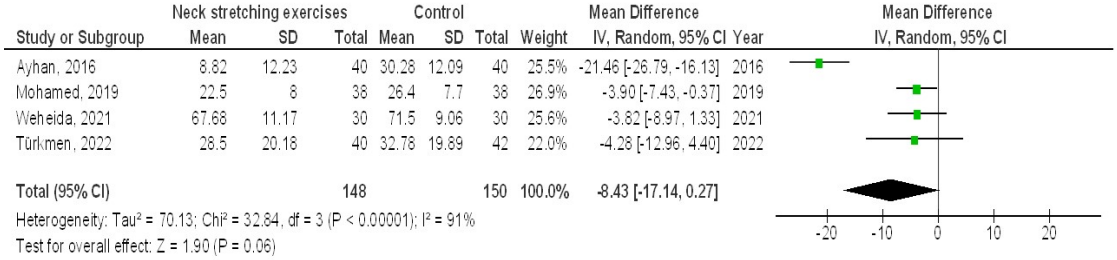

Fig. 5: The neck stretching exercises compared to control treatment's forest plot influence on mean self-reported neck disability score after 1 week in patients with thyroidectomy

Using stratified models to observe the possessions of certain constituents was not likely owing to the lack of data, such as ethnicity, gender, and age, on comparison consequences. The visual assessment of the funnel plot and the quantitative Egger regression test (P=0.87) revealed no evidence of study bias. However, most of the relevant RCTs exhibited poor technical quality, and there was no indication of bias in selective reporting.

Discussion

The meta-analysis included studies involving 1,034 patients who underwent thyroidectomy (20-24). Among these patients, those who performed neck stretching exercises reported significantly lower mean neck pain scores after one week and one month, as well as a lower mean self-reported neck disability score after one month, compared to the control group. However, there was no significant difference in the mean self-reported neck disability score after 1 week between the neck stretching exercises and the control treatment after one month. More research is necessary to confirm this discovery, and care must be used while interacting with its values since many comparisons had a large number of included articles and a small sample size of most of them. The significance of the reviewed assessments would be affected by that.

Postoperative cervical pain and discomfort are considerable concerns for patients having surgical interventions, including simple thyroidectomy (1). One study assessed pain scores associated with simple thyroidectomy as the third highest among head and neck surgical procedures for pain severity. (24) Postoperative analgesia is often necessary for all patients, encompassing options from paracetamol to opioid-based analgesics (24). A retrospective investigation indicated opioid prescription rates of 54.5% after complete thyroidectomy, 55.6% after partial thyroidectomy, and 63.5% after lobectomy (25). Consequently, recognizing non-pharmacological approaches to alleviate neck pain and discomfort post-thyroidectomy and diminish the necessity for postoperative analgesics is advantageous. This method may potentially reduce the necessity for analgesics, warranting assessment in subsequent trials.

Various mechanisms have been suggested for this effect. Neck stretching exercises strengthen muscle flexibility and improve neuromuscular coordination (26). Nonetheless, prolonged and improper stretching workouts have been linked to diminished muscle strength. Ayhan et al. indicated no substantial advantage one-month post-surgery, attributing the alleviation of pain to spontaneous resolution irrespective of the exercise intervention (20). Notably, neck stretching exercises may result in an escalation of modest neck pain and impairment one-week post-thyroidectomy. The research reviewed fails to offer a definitive clinical rationale for this phenomenon; rather, it may be ascribed to first muscular soreness stemming from neck movement after extended immobility under anesthesia. Although the neck stretching exercises group initially experienced modest discomfort, they may ultimately gain by moving their neck muscles postoperatively, perhaps reducing the occurrence of severe neck pain and disability after one month. Consequently, this negligible and transient effect of exercise should be taken into account when advising patients regarding the possibility of heightened discomfort resulting from muscle contraction. This discovery must be approached with caution. Effective pain management following thyroidectomy enhances a patient's QoL, accelerates the resumption of normal daily activities, and diminishes persistent postoperative discomfort (27).

Historical analgesic approaches encompassed opioids and non-steroidal anti-inflammatory medications (1). Although opioids have beneficial effects, they are linked to numerous adverse events, e.g. nausea, vomiting, urine retention, somnolence, and hypoventilation (28). Moreover, the existing opioid pain management approach may aggravate the persistent opioid problem, especially in the United States (29). Consequently, minimizing postoperative opioid prescriptions is essential, and alternative postoperative modalities may positively contribute to this objective. Notwithstanding the advantageous impact on pain and impairment, we

saw limited evidence that neck stretching activities enhanced the patients' QoL. QoL was not examined by all the studies included and was not regarded as a formal outcome of our analysis. Only Thorsen et al. documented QoL, observing no disparity between patients who engaged in neck stretching activities and the control group, as assessed by the thyroid patient-reported outcome instrument many times over a period of up to three months postoperatively (3). Merely 13% of their patients got complete thyroidectomy, and their study excluded patients with malignant thyroid conditions (3). Patients with malignant thyroid diseases frequently concentrate on their primary illness and may neglect minor issues like neck pain, in contrast to those with benign conditions (30). Moreover, thyroid cancer generally necessitates a more extensive surgical intervention in the cervical region, frequently leading to longer anesthesia and heightened incidence of postoperative discomfort and other complications (3).

A disagreement exists concerning the effect of neck stretching exercises on wound healing following thyroidectomy, despite their established benefits for disability and pain. The effect of neck stretching exercises must be evaluated concerning the wound, despite only one patient in their cohort exhibiting wound healing difficulties, while the overall complication rates remained within anticipated parameters (20). Patient satisfaction regarding scar appearance following thyroidectomy was comparable across groups that engaged in neck exercises and those that did not (19, 20). Neck stretching activities are unlikely to adversely affect wound healing and can be commenced early post-surgery without compromising scar appearance. Nonetheless, it is crucial to interpret this conclusion with caution, given it relies on only two research (19, 20).

Additional research is required to examine this result. Considering the identified advantages in this research, it may be prudent to integrate neck stretching protocols into the management and follow-up strategies for specific thyroidectomy patients. Nonetheless, the selection of patients is essential, and it is advisable to see a physical therapist to create a tailored workout regimen. In instances where wound healing problems arise, neck stretching exercises should be prohibited (20). Future research should investigate the synergistic effects of neck stretching exercises alongside other postoperative therapies, e.g., wound massage or kinesio taping, demonstrated potential in alleviating postoperative pain (1). We also recommend conducting studies with larger sample sizes and more comprehensive data on potential moderators (e.g., duration or intensity of the exercise program, type of assessment instrument utilized, baseline levels of pain or disability, and the ratio of patients undergoing total versus partial thyroidectomy) to facilitate further analysis of their effects on outcomes. None of the existing trials assessed the impact of neck stretching exercises on patients' analgesic usage; therefore, this significant outcome should be prioritized in future studies. Moreover, a more thorough examination of the impacts on wound healing and complications, alongside an assessment of results among men and across other geographical regions including Europe, Australia, Asia, Africa, and North America, would augment the overall comprehensiveness of the research.

High levels of heterogeneity, the source of which could not be ascertained using a meta-regression analysis, must be taken into consideration when interpreting these results. Sample error, and publication bias, are likely to have contributed to heterogeneity. Since most of the listed research produced results with small sample sizes, higher sample sizes are required for studies to produce more compelling data. Because of inadequate reporting and a lack of clarification from study authors, it was frequently unclear whether studies were susceptible to bias. Additionally, the bias assessment revealed extremely low to intermediate methodological quality, which means we are unable to make definitive judgments regarding the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain. The evaluations in the certainty assessment were significantly impacted by the domains of indirectness of evidence and risk of bias. The lack of information about allocation concealment reduced the quality of evidence by one degree. Since we discovered a significant amount of variation in the results for

which we were unable to find a reasonable explanation, the generalization outcome's certainty evaluation was also reduced by one notch for inconsistency.

These findings support the need for more study and will probably significantly affect our ability to predict the treatment's effectiveness. As a result, more high-quality studies and data about the efficacy of neck stretching exercises in mitigating self-reported disability post-thyroidectomy and neck pain.

Limitations

The primary drawback is that the majority of the included studies lacked information on lumbar stability, degree of slippage, and patients' primary symptoms. This restriction prevented us from performing additional stratified analysis, which likely had an impact on the results of various surgical procedures. Therefore, we are unable to identify which patient groups would profit from further post-surgery. Furthermore, we lacked sufficient data to assess the potential influence of age, sex, and race on outcomes. Including inaccurate or partial data from past studies might have led to an increase in bias. In addition to their nutritional state, the patient's age, gender, race, and nutrition were probably biassed. Incomplete data and unreported research may result in values that are inadvertently skewed. Additionally, observational evidence, small sample sizes, high heterogeneity, learning-curve bias, and short follow-up; comparing results objectively with control meta-analyses without restating numbers already presented are all limitations of this study.

Conclusion

In patients who underwent thyroidectomy, those who performed neck stretching exercises reported significantly lower mean neck pain scores after one week and one month, as well as a lower mean self-reported neck disability score after one month, in comparison to the control group. However, no significant difference was observed in the mean self-reported neck disability score after 1 week between the neck stretching exercises and the control treatment after one month. Further research is needed to validate these findings, and caution should be exercised when interpreting the results, as many of the comparisons involved a limited number of studies and small sample sizes. This could impact the significance of the assessments reviewed.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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